Porous and composite ceramics.

Tobias FEY

Akademischer OberratGruppenleiter Zellulare Keramiken und Simulation Department

Universität Erlangen-Nürnberg (FAU), Martensstr. 5, D-91058 Erlangen, Germany.

Cellular materials and their composite (polymer/metal) offer a wide spectrum of compromising applications such as catalyst support structures, lightweight materials, energy adsorption or energy storage materials. Due to several ways of ceramic processing as replica or 3D-printing and materials a wide range of material properties e.g. thermal conductivity, mechanical strength or dumping can be adjusted, measured and verified concerning to the expected properties.

In heterogeneous and homogenous porous structures and their composites only global effective material properties can be measured by experiment. The influence of microstructure on these properties is hard to determine experimentally especially for composite structures. To close this gap and enable a "look-in" , a microstructure model derived from µ-CT measurements carried out at certain processing steps can be used as model for FEM-calculations. Combing estimated material properties by experiment with microstructure µCT derived models offers the possibility to carry out different simulations over different hierarchical levels. In contrast to experiments also the pore network and its influence on global parameter can be analyzed. This approach is carried out on different cellular structures as heterogeneous ceramic foams, homogenous lattice structures and syntactic foams and their composites.